

**What is claimed is:**

1. A method for controlling a voltage regulator comprising the steps of:

a) providing first and second charge storage devices switchably connected between a voltage source  
5 and the voltage regulator;

b) switching the first storage device into connection with the voltage source until the voltage on it reaches a predetermined level;

c) disconnecting the first storage device from  
10 the voltage source and switching it into connection with the second storage device and the voltage regulator until the voltage input to the voltage regulator falls below a predetermined level; and

d) repeating steps b) and c).

2. The method according to claim 1, wherein the storage devices comprise capacitors connected in parallel with the voltage regulator, across the voltage source.

3. The method according to claim 1, wherein the switching is performed by two switches connected in series, one between the voltage source and the first storage device and the other between the first and  
5 second storage devices.

4. The method according to claim 1, wherein the first storage device is significantly larger than the second storage device.

5. An apparatus for controlling a voltage regulator comprising:

a voltage source;

a first and second charge storage devices

5 connected between the voltage source and the voltage regulator;

means for connecting the first storage device to the voltage source and disconnecting it from the second storage device and the voltage regulator until  
10 the voltage on the first storage device reaches a predetermined level;

means for disconnecting the first storage device from the voltage source and connecting it to the second storage device and the voltage regulator  
15 until the input voltage to the voltage regulator falls below a predetermined level; and

means for switching the storage devices between the 2 modes of operation.

6. The apparatus according to claim 5, wherein the storage devices are capacitors.

7. The apparatus according to claim 5, wherein the

connecting means comprises two switches are connected  
in series between the voltage source and the first  
storage device, the other between the two storage  
5 devices.

8. The apparatus according to claim 4, wherein the  
first storage device is substantially larger than the  
second storage device.

9. A power supply apparatus comprising:  
a power supply;  
a voltage regulator;  
first and second capacitors provided between  
5 said power supply and said voltage regulator in  
parallel to said power supply;  
a first switch provided between said power  
supply and said first capacitor to open or close in  
response to a first control signal;  
10 a second switch provided between said power  
supply and said second capacitor to open or close in  
response to a second control signal; and  
a control circuit which generates said first  
and second control signals to said first and second  
15 switches such that said second switch opens and then  
said first switch closes when a voltage of said second  
capacitor decreases to a first predetermined level,  
and such that said first switch opens and said second

switch closes after a first predetermined time period  
20 from the closing said first switch.

10. The power supply apparatus according to claim  
9, wherein said first predetermined time is a time  
period until a voltage of said first capacitor reaches  
a second predetermined level after said first switch  
5 is closed.

11. The power supply apparatus according to claim  
9, wherein said control circuit generates said first  
and second control signals to repeat a switching  
operation in which said second switch opens and then  
5 said first switch closes when the voltage of said  
second capacitor decreases to said first predetermined  
level, and said first switch opens and said second  
switch closes after said first predetermined time  
period from the closing said first switch.

12. The power supply apparatus according to claim  
9, wherein said control circuit monitors the voltage  
of said second capacitor and generates said first and  
second control signals based on the monitoring result.

13. The power supply apparatus according to claim  
9, wherein said second capacitor is larger in  
capacitance than said first capacitor.

14. A power supply apparatus comprising:  
a power supply;  
a voltage regulator;  
first and second capacitors provided between

5 said power supply and said voltage regulator in  
parallel to said power supply;

a first switch provided between said power  
supply and said first capacitor to open or close in  
response to a first control signal;

10 a second switch provided between said power  
supply and said second capacitor to open or close in  
response to a second control signal; and

a control circuit which generates said first  
and second control signals to said first and second  
15 switches such that said second switch opens and then  
said first switch closes when a voltage of said first  
capacitor decreases to a first predetermined level,  
and such that said first switch opens and said second  
switch closes after a first predetermined time period  
20 from the closing said first switch.

15. The power supply apparatus according to claim  
14, wherein said first predetermined time is a time  
period until a voltage of said first capacitor reaches  
a second predetermined level after said first switch  
5 is closed.

16. The power supply apparatus according to claim 14, wherein said control circuit generates said first and second control signals to repeat a switching operation in which said second switch opens and then  
5 said first switch closes when the voltage of said first capacitor decreases to said first predetermined level, and said first switch opens and said second switch closes after said first predetermined time period from the closing said first switch.

17. The power supply apparatus according to claim 14, wherein said control circuit monitors the voltage of said first capacitor and generates said first and second control signals when the voltage of said first  
5 capacitor decreases to said first predetermined level.

18. The power supply apparatus according to claim 14, wherein said second capacitor is larger in capacitance than said first capacitor.

19. The power supply apparatus according to claim 14, wherein said control circuit monitors the voltage of said first capacitor and an output voltage of said voltage regulator and generates said first and second  
5 control signals based on the voltage of said first capacitor to the output voltage of said voltage regulator.